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EDUCATION

Ph.D. in Geological and Environmental Sciences, Stanford University, Stanford, CA, 2004
Dissertation title: Molecular Scale Studies of Uranium Speciation in Contaminated Hanford, Washington Sediments and Related Model Systems
Dissertation adviser: Prof. Gordon E. Brown, Jr.

B.S. in Geology (Environmental), cum laude with distinction, University of Illinois at Urbana-Champaign, Urbana, IL, 1999
Thesis title: Geochemical Investigation into the Source of Natural Arsenic Contamination in the Mahomet Valley Aquifer, East-Central Illinois
Thesis adviser: Prof. Stephen P. Altaner

RESEARCH EXPERIENCE

Postdoctoral Fellow, Environmental Research Division, Argonne National Laboratory, Argonne, IL, 2004-Present
Investigating the structure and reactivity of mineral surfaces, with a focus on water structure and adsorption and redox processes occurring at the miner-water interface. Paul Fenter, adviser.

Doctoral Candidate, Department of Geological and Environmental Sciences, Stanford University, Stanford, CA, 1999-2004
Studied the speciation of uranium in contaminated sediments from a nuclear waste site in Hanford, WA. In addition, examined how adsorption processes occurring at the mineral-water interface may affect uranium speciation and transport potential.

Undergraduate Research Assistant, Department of Geology, University of Illinois at Urbana-Champaign, Urbana, IL, 1998-1999
Investigated potential sources of natural arsenic contamination in a local aquifer in East-Central Illinois.

Student Assistant, National Water Quality Assessment Program, Water Resources Division, U.S. Geological Survey, Urbana, IL, 1997-1999
Assisted in data collection for the National Water Quality Assessment Program. Collected water samples, constructed/removed sampling wells, characterized well location land use, and maintained water quality database.

TEACHING EXPERIENCE

Teaching Assistant, GES 170 (Environmental Geochemistry), Stanford University, 2000

- Attended lectures
- Implemented the use of geochemical modeling software in coursework
- Co-wrote and graded problem sets
- Organized midterm and final exam review sessions

Teaching Assistant, GES 80 (Earth Materials), Stanford University, 1999

- Attended lectures
- Lectured in laboratory sessions
- Held weekly evening office hours in laboratory
- Co-wrote laboratory final exam
- Organized midterm and final exam review sessions

ADVISING EXPERIENCE

Undergraduate Academic Advisor, Undergraduate Advising Center, Stanford University, 2001-2003

Graduate Student Mentor, Department of Geological and Environmental Sciences, Stanford University, 2000-2004

HONORS, AWARDS, AND FELLOWSHIPS

- Harold Urey Postdoctoral Fellowship, Argonne National Laboratory, 2004-Present
  One of four postdoctoral fellowships awarded internationally on an annual basis to outstanding doctoral scientists and engineers who are at early points in promising careers. The fellowships are named after scientific and technical luminaries who have been associated with the laboratory, its predecessors and the University of Chicago.
- Student Travel Grant, 40th Annual Meeting of the Clay Mineral Society, 2003
- Outstanding Student Presentation, Volcanology, Geochemistry, and Petrology Section, American Geophysical Union Fall Meeting, 2002
- Graduate Student Poster Prize, Environmental Sciences, 29th Annual Stanford Synchrotron Radiation Laboratory Users Meeting, 2002
- Corning Foundation Science Fellow, Stanford University, 2000-2001
  Awarded yearly to one graduate student in the Department of Geological and Environmental Sciences
- USGS STAR Award, Water Resources Division, U.S. Geological Survey, 1999
  STAR (Special Thanks for Achieving Results) awards recognize one-time acts of service or accomplishments that are noteworthy
- Geology Alumni Award for the Outstanding Senior in Geology, University of Illinois, 1999
  Awarded to the top senior in the Department of Geology
- Rocky Mountain Alumni Field Camp Scholarship, University of Illinois, 1998
- Estwing Award, University of Illinois, 1998
  Awarded to the top junior in the Department of Geology

STANFORD UNIVERSITY SERVICE

- School of Earth Sciences Academic Programs Committee, 2004
- University Committee on Graduate Studies, 2003-2004
- Graduate Student Academic Life Survey Development Committee, 2003-2004
- Tresidder Dining Advisory Group, 2003-2004
- Administrative Panel on Radiological Safety, 2002-2003
- University Committee on Health and Safety, 2002-2003
- Stanford Student Enterprises Board of Directors, 2002-2003
- Graduate Student Council, Elected Member and Financial Officer, 2002-2003
- School of Earth Sciences Graduate Student Advisory Committee, 2001-2002

PROFESSIONAL SOCIETY MEMBERSHIPS

- Clay Mineral Society
- Mineralogical Society of America
- The Geochemical Society
- American Chemical Society
- American Geophysical Union
- International XAFS Society

REVIEWER FOR SCHOLARLY JOURNALS

- *Environmental Science & Technology*
- *Geochemical Journal*
- *Geochimica et Cosmochimica Acta*
- *Geology*
- *Thermochimica Acta*

OTHER PROFESSIONAL ACTIVITIES

Session Co-Chair, Synchrotron-Based Analytical Techniques for Nuclear and Environmental Sciences, *225th National Meeting of the American Chemical Society*, March 2003.

Reviewer, U.S. Civilian Research and Development Foundation

REFEREED PUBLICATIONS

Pierce E.M., Icenhower J.P., Serne R.J., and Catalano J.G. (2005) Experimental determination of UO_2 (cr) dissolution kinetics: effects of solution saturation state and pH. *Journal of Nuclear Materials*, in press.

Catalano J.G, Trainor T.P., Eng P.J., Waychunas G.A., and Brown G.E., Jr. (2005) CTR diffraction and grazing-incidence EXAFS study of U(VI) adsorption onto α-Al_2O_3 and α-Fe_2O_3 $(1\bar{1}02)$ surfaces. *Geochimica et Cosmochimica Acta*, in press.

Catalano J.G., and Brown G.E., Jr. (2005) Uranyl adsorption onto montmorillonite: Evaluation of binding sites and carbonate complexation. *Geochimica et Cosmochimica Acta* **69**, 2995-3005.

Wang Z., Zachara J.M., Gassman P.L., Liu C., Qafoku O., Yantasee W., and Catalano, J.G. (2005) Fluorescence spectroscopy of U(VI)-silicates and U(VI)-contaminated Hanford sediment. *Geochimica et Cosmochimica Acta* **69**, 1391-1403.

Catalano J.G., Warner J.A., and Brown G.E., Jr. (2005) Sorption and precipitation of Co(II) in Hanford sediments and alkaline aluminate solutions. *Applied Geochemistry* **20**, 193-205.

Brown G.E., Jr., Catalano J.G., Templeton A.S., Trainor T.P., Farges F., Bostick B.C., Kendelewicz T., Doyle C.S., Spormann A.M., Revill K., Morin G., Juillot F., and Calas G. (2005) Environmental interfaces, heavy metals, microbes, and plants: Applications of XAFS spectroscopy and related synchrotron radiation methods to environmental sciences. *Physica Scripta* **T115**, 80-87.

Trainor T.P., Chaka A.M., Eng P.J., Newville M., Waychunas G.A., Catalano J.G, and Brown G.E., Jr. (2004) Structure and reactivity of the hydrated hematite (0001) surface. *Surface Science* **573**, 204-224.

Catalano J.G., and Brown G.E., Jr. (2004) EXAFS study of uranyl adsorption on Wyoming montmorillonite. In: *Water-Rock Interaction, Proceedings of the 11th International Symposium on Water-Rock Interaction, Saratoga Springs, NY, June 27-July 2, 2004* (eds. R.B. Wanty and R.R. Seal II). A.A. Balkema Publishers, Leiden, The Netherlands. Vol. 1, pp. 665-670.

Catalano J.G., and Brown G.E., Jr. (2004) Analysis of uranyl-bearing phases by EXAFS spectroscopy: Interferences, multiple scattering, accuracy of structural parameters, and spectral differences. *American Mineralogist* **89**, 1004-1021.

Catalano J.G., Heald S.M., Zachara J.M., and Brown G.E., Jr. (2004) Spectroscopic and diffraction study of uranium speciation in contaminated vadose zone sediments from the Hanford Site, Washington State. *Environmental Science & Technology* **38**, 2822-2828.

Zachara J.M., Ainsworth C.C., Brown G.E., Jr., Catalano J.G., McKinley J.P., Qafoku O., Smith S.C., Szecsody J.E., Traina S.J., and Warner J.A. (2004) Chromium speciation and mobility in a high level nuclear waste vadose zone plume. *Geochimica et Cosmochimica Acta* **68**, 13-30.

Helean K.B., Navrotsky A., Lumpkin G.R., Colella M., Lian J., Ewing R.C., Ebbinghaus B., and Catalano J.G. (2003) Enthalpies of formation of U-, Th-, Ce-brannerite: implications for plutonium immobilization. *Journal of Nuclear Materials* **320**, 231-244.

Helean K.B., Navrotsky A., Vance E.R., Carter M.L., Ebbinghaus B., Krikorian O., Lian J., Wang L.M., and Catalano J.G. (2002) Enthalpies of formation of Ce-pyrochlore, $Ca_{0.93}Ce_{1.00}Ti_{2.035}O_{7.00}$, U-pyrochlore, $Ca_{1.46}U^{4+}_{0.23}U^{6+}_{0.46}Ti_{1.85}O_{7.00}$ and Gd-pyrochlore, $Gd_2Ti_2O_7$: Three materials relevant to the proposed waste form for excess weapons plutonium. *Journal of Nuclear Materials* **303**, 226-239.

Chambers S.A., Farrow R.F.C., Maat S., Toney M.F., Folks L., Catalano J.G., Trainor T.P. and Brown G.E., Jr. (2002) Molecular beam epitaxial growth and properties of $CoFe_2O_4$ on MgO(001). *Journal of Magnetism and Magnetic Materials* **246**, 124-139.

PUBLICATIONS IN REVIEW

Wellman D.M., Catalano J.G., Icenhower J.P., and Gamerdinger A.P. (2004) Synthesis and characterization of sodium meta-autunite, $Na_2[(UO_2)(PO_4)]_2 \cdot 3H_2O$. *Radiochimica Acta*, submitted.

Waychunas G.A., Trainor T.P., Eng P.J., Catalano J.G., Brown G.E., Jr., Davis J.A., Rogers J., and Bargar J.R. (2005) Surface complexation studied via combined grazing-incidence EXAFS and surface diffraction: Arsenate on hematite (0001) and $(10\bar{1}2)$. *Analytical and Bioanalytical Chemistry*, submitted.

PRESENTATIONS

Catalano J.G., Wang Z., McKinley J.P., Zachara J.M., Heald S.M., Brown G.E., Jr. (2005) Probing uranium speciation in contaminated Hanford sediments. Invited oral presentation at *The 15th Annual Goldschmidt Conference*, May 2005, Moscow, ID.

Catalano J.G., Trainor T.P., Eng P.J., Waychunas G.A., Brown G.E., Jr. (2005) Surface x-ray scattering and spectroscopy studies of U(VI) adsorption on corundum and hematite single-crystal surfaces. Oral presentation at the *229thNational Meeting of the American Chemical Society*, March 2005, San Diego, CA.

Catalano J.G. (2004) Probing uranium speciation in contaminated sediments and at the mineral-water interface. Invited presentation at *University of Illinois at Urbana-Champaign Geology Department Colloquium*, October 2004, Urbana, IL.

Catalano J.G., Heald S.M., Zachara J.M., Trainor T.P., Eng P.J., Waychunas G.A., Brown G.E., Jr. (2004) Synchrotron-based studies of uranium speciation in contaminated sediments and related model systems. Oral presentation at *Actinide-XAS-2004: 3rd Workshop of Speciation, Techniques, and Facilities for Radioactive Materials at Synchrotron Light Sources*, September 2004, Berkeley, CA.

Catalano J.G. and Brown G.E., Jr. (2004) EXAFS study of uranyl adsorption on Wyoming montmorillonite. Oral presentation at *WRI-11: The 11th International Symposium on Water-Rock Interaction*, June/July 2004, Saratoga Springs, NY.

Catalano J.G. (2004) X-ray spectroscopic studies of uranium speciation in 300 Area samples. Invited oral presentation at *Workshop on Conceptual Model Development and Reactive Transport Modeling for the 300 Area Uranium Plume in 300-FF-5*, May 2004, Richland, WA.

Catalano J.G., Zachara J.M., McKinley J.M., Heald S.M., and Brown G.E., Jr. (2003) X-ray spectroscopic and diffraction study of the distribution and speciation of uranium in contaminated sediments from the DOE's Hanford site. Invited oral presentation at the *30th Annual Stanford Synchrotron Radiation Laboratory Users' Meeting*, October 2003, Menlo Park, CA.

Catalano J.G., and Brown G.E., Jr. (2003) Spectroscopic study of uranyl adsorption on Wyoming montmorillonite: Factors affecting surface complexation. Oral presentation at *Classic Clays and Minerals: The Clay Minerals Society 40th Annual Meeting and Mineralogical Society of America Spring Meeting*, June 2003, Athens, GA.

Catalano J.G., Zachara J.M., McKinley J.M., Heald S.M., and Brown G.E., Jr. (2003) X-ray spectroscopic and diffraction study of the distribution and speciation of uranium in contaminated sediments from the DOE's Hanford site. Oral presentation at the *225thNational Meeting of the American Chemical Society*, March 2003, New Orleans, LA.

Catalano J.G., Zachara J.M., McKinley J.M., Heald S.M., and Brown G.E., Jr. (2002) X-ray Spectroscopic Investigation of the Distribution and Speciation of Uranium in Contaminated Sediments From the DOE's Hanford Site. Oral presentation at the *American Geophysical Union 2002 Fall Meeting*, December 2002, San Francisco, CA.

Trainor T.P., Eng P.J., Catalano J.G., Waychunas G.A., Brown G.E., Jr., Newville M., Sutton S.R., Rivers M. (2002) Structure of the Hydrated α-Fe_2O_3 (0001) Surface. Poster presentation at the *American Geophysical Union 2002 Fall Meeting*, December 2002, San Francisco, CA.

Catalano J.G., Zachara J.M., and Brown G.E., Jr. (2002) X-ray Spectroscopic Investigation of the Distribution and Speciation of Uranium in Contaminated Sediments From the DOE's Hanford Site. Poster presentation at the *29th Annual Stanford Synchrotron Radiation Laboratory Users' Meeting*, October 2002, Menlo Park, CA.

Catalano J.G., Warner J.A., Ainsworth C.C., Zachara J.M., Traina S.J., and Brown G.E., Jr. (2002) XAFS studies of chromium and uranium speciation in Hanford vadose zone sediments. Oral presentation at the *223rd National Meeting of the American Chemical Society*, April 2002, Orlando, FL.

Catalano J.G., Warner J.A., Ainsworth C.C., Zachara J.M., Traina S.J., and Brown G.E., Jr. (2001) X-ray Spectroscopic Study of the Speciation Of Chromium in Hanford S-SX Tank Farm Core Samples. Poster presentation at the *28th Annual Stanford Synchrotron Radiation Laboratory Users' Meeting*, October 2001, Menlo Park, CA.

Catalano J.G. and Brown G.E., Jr. (2001) XAFS Spectroscopic Investigation of Co and U Speciation in Model Hanford Tank Waste Systems. Poster presentation at the *28th Annual Stanford Synchrotron Radiation Laboratory Users' Meeting*, October 2001, Menlo Park, CA.

Catalano J.G., Warner J.A., Chen C.-C., Yamakawa I., Newville M., Sutton S.R., Ainsworth C.C., Zachara J.M., Traina S.J., and Brown G.E., Jr. (2001) X-ray spectroscopic and fluorescence study of the speciation and distribution of chromium in Hanford S-SX Tank Farm core samples. Oral presentation at the *222nd National Meeting of the American Chemical Society*, August 2001, Chicago, IL

Catalano J.G., Warner J.A., and Brown G.E., Jr. (2001) Spectroscopic investigation of Co and U speciation in model leachate-solid systems. Poster presentation at the *222nd National Meeting of the American Chemical Society*, August 2001, Chicago, IL

Catalano J.G., Warner J. A., Brown G.E., Jr. (2001) Spectroscopic Studies of Radionuclide Speciation in Model Systems and Contaminated Sediments. Invited oral presentation at the *Conference of the 2000-2001 Corning Foundation Science Fellows*, May 2001, Corning, NY.

Catalano J.G., Altaner S.P., and Warner K.L. (1999) Geochemical Investigation of the Source of Natural Arsenic Contamination in the Mahomet Valley Aquifer, East-Central Illinois. Poster presentation at the *Geological Society of America, North-Central Region Spring Meeting 1999*, April 1999, Champaign, IL.

TECHNICAL REPORTS

Catalano J.G, Trainor T.P., Eng P.J., Waychunas G.A., and Brown G.E., Jr. (2004) *Crystal truncation rod diffraction study of U(VI) adsorption on the α-Fe_2O_3 $(1\bar{1}02)$ surface*. 2003 Activity Report, Advanced Photon Source.

Catalano J.G., Brown G.E., Jr., and Zachara J.M., (2004) *An XAFS and μSXRF study of uranium and copper speciation in contaminated sediments from the 300 Area, Hanford, WA.* 2003 Activity Report, Advanced Photon Source.

Catalano J.G, Trainor T.P., Eng, P.J., Waychunas, G.A., and Brown, G.E., Jr. (2003) *CTR diffraction study of U(VI) adsorption to the α-Al_2O_3 $(1\bar{1}02)$ surface*. 2002 Activity Report, Advanced Photon Source.

Catalano J.G., Heald S.M., Zachara J.M., and Brown G.E., Jr. (2003) *X-ray microdiffraction study of uranium speciation in contaminated vadose zone sediments from the Hanford Site, WA.* 2002 Activity Report, Advanced Photon Source.

Trainor T.P., Eng P.J., Newville M., Waychunas G.A., Catalano J.G, and Brown G.E., Jr. (2003) *Crystal truncation rod study of the hydrated α-Fe_2O_3 $(1\bar{1}02)$ surface*. 2002 Activity Report, Advanced Photon Source.

Catalano J.G., Zachara J.M., and Brown G.E., Jr. (2002) *X-ray Spectroscopic Investigation of the Distribution and Speciation of Uranium in Samples from the BX-102 Borehole*. B-BX-BY FIR: Digest of S&T Evaluations. United States Department of Energy, Richland Operations, Richland, WA 99352.

Wang Z., Zachara J.M., Gassman P.L., Liu C.X., and Catalano J.G. (2002) *Fluorescence Spectroscopic Studies of Uranium-Bearing Vadose Zone Sediments.* B-BX-BY FIR: Digest of S&T Evaluations. United States Department of Energy, Richland Operations, Richland, WA 99352.

Serne R.J., Brown C.F., Schaef H.T., Pierce E.P., Lindberg M.J., Wang Z., Gassman P., and Catalano J.G. (2002) *300 Area Uranium Leach and Adsorption Project Report.* ERC FY01-02 Final Report. United States Department of Energy, Richland Operations, Richland, WA 99352.

Catalano J.G., Warner J.A., Chen C-C., Yamakawa I., Newville M., Sutton S.R., Ainsworth C.C., Zachara J.M., Traina S.J., Brown G.E., Jr. (2002) *Distribution and Speciation of Chromium in Hanford Tank Farm SX-108 and 41-09-39 Core Samples Determined by X-ray Absorption Spectroscopy.* 2001 Activity Report, Advanced Photon Source.

Catalano J.G., Warner J.A., Chen C.-C., Yamakawa I., Ainsworth C.C., Zachara J.M., Traina S.J., and Brown G.E., Jr. (2001) *EXAFS Determination of the Chemical Speciation and Sorption Processes of Sr(II), Co(II), U(VI), and Cr(VI) at Hanford: Model Systems and Contaminated Sediments.* 2000 Activity Report, Stanford Synchrotron Radiation Laboratory.

Catalano J.G., Warner J.A., Chen C.-C., Yamakawa I., Newville M., Sutton S.R., Ainsworth C.C., Zachara J.M., Traina S.J., and Brown G.E., Jr. (2001) *Speciation of Chromium in Hanford Tank Farm SX-108 and 41-09-39 Core Samples Determined by X-ray Absorption Spectroscopy.* S-SX FIR Appendix E: Digest of S&T Evaluations. United States Department of Energy, Richland Operations, Richland, WA 99352.

Kim C.S., Catalano J.G., Grolimund D., Warner J.A., Morin G., Juillot F., Calas G.C., Ildefonse P., Rytuba J.J., Parks G.A., and Brown G.E., Jr. (2000) *EXAFS Determination of the Chemical Speciation and Sorption Processes of Hg(II), Sr(II), and Zn(II) in Natural and Model Systems*. 1999 Activity Report, Stanford Synchrotron Radiation Laboratory.

REFERENCES

Prof. Gordon E. Brown, Jr. (Ph.D. Adviser)
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Prof. Dennis K. Bird (Ph.D. Dissertation Committee Member)
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